

Module 15

Evolutionary Psychology: Understanding Human Nature

Module Learning Objectives

- 15-1** Describe evolutionary psychologists' use of natural selection to explain behavior tendencies.
- 15-2** Discuss evolutionary explanations for gender differences in sexuality and mating preferences.
- 15-3** Summarize the key criticisms of evolutionary psychology, and describe how evolutionary psychologists respond.
- 15-4** Describe the biopsychosocial approach to individual development.

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- 15-1** How do evolutionary psychologists use natural selection to explain behavior tendencies?

Behavior geneticists explore the genetic and environmental roots of human differences. **Evolutionary psychologists** instead focus mostly on what makes us so much alike. They use Charles Darwin's principle of natural selection to understand the roots of behavior and mental processes. Richard Dawkins (2007) calls **natural selection** "arguably the most momentous idea ever to occur to a human mind." The idea, simplified, is this:

- Organisms' varied offspring compete for survival.
- Certain biological and behavioral variations increase organisms' reproductive and survival chances in their particular environment.
- Offspring that survive are more likely to pass their genes to ensuing generations.
- Thus, over time, population characteristics may change.

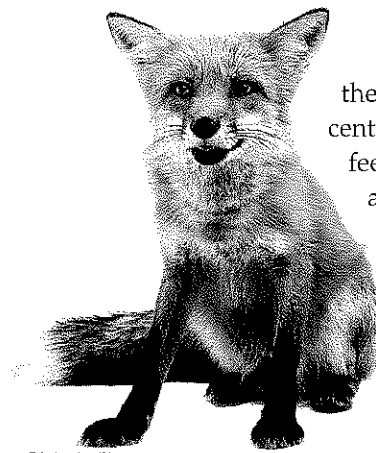
To see these principles at work, let's consider a straightforward example in foxes.

Natural Selection and Adaptation

A fox is a wild and wary animal. If you capture a fox and try to befriend it, be careful. Stick your hand in the cage and, if the timid fox cannot flee, it may snack on your fingers. Russian scientist Dmitry Belyaev wondered how our human ancestors had domesticated dogs from their equally wild wolf forebears. Might he, within a comparatively short stretch of time, accomplish a similar feat by transforming the fearful fox into a friendly fox?

evolutionary psychology the study of the evolution of behavior and the mind, using principles of natural selection.

natural selection the principle that, among the range of inherited trait variations, those contributing to reproduction and survival will most likely be passed on to succeeding generations.



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To find out, Belyaev set to work with 30 male and 100 female foxes. From their offspring he selected and mated the tamest 5 percent of males and 20 percent of females. (He measured tameness by the foxes' responses to attempts to feed, handle, and stroke them.) Over more than 30 generations of foxes, Belyaev and his successor, Lyudmila Trut, repeated that simple procedure. Forty years and 45,000 foxes later, they had a new breed of foxes that, in Trut's (1999) words, are "docile, eager to please, and unmistakably domesticated. . . . Before our eyes, 'the Beast' has turned into 'beauty,' as the aggressive behavior of our herd's wild [ancestors] entirely disappeared." So friendly and eager for human contact are they, so inclined to whimper to attract attention and to lick people like affectionate dogs, that the cash-strapped institute seized on a way to raise funds—marketing its foxes to people as house pets.

Over time, traits that are *selected* confer a reproductive advantage on an individual or a species and will prevail. Animal breeding experiments manipulate genetic selection and show its powers. Dog breeders have given us sheepdogs that herd, retrievers that retrieve, trackers that track, and pointers that point (Plomin et al., 1997). Psychologists, too, have bred animals to be serene or reactive, quick learners or slow.

Does the same process work with naturally occurring selection? Does natural selection explain our human tendencies? Nature has indeed selected advantageous variations from the new gene combinations produced at each human conception and the **mutations** (random errors in gene replication) that sometimes result. But the tight genetic leash that predisposes a dog's retrieving, a cat's pouncing, or an ant's nest building is looser on humans. The genes selected during our ancestral history provide more than a long leash; they endow us with a great capacity to learn and therefore to *adapt* to life in varied environments, from the tundra to the jungle. Genes and experience together wire the brain. Our adaptive flexibility in responding to different environments contributes to our *fitness*—our ability to survive and reproduce.

mutation a random error in gene replication that leads to a change.

Evolutionary Success Helps Explain Similarities

Although our person-to-person differences grab attention, we humans are also strikingly alike. As brothers and sisters in one great human family, we all wake and sleep, think and speak, hunger and thirst. We smile when happy and favor what's familiar more than what is foreign. We return favors, fear snakes, grieve death, and, as social animals, have a need to belong. Beneath our differing skin, we all are kin. Evolutionary psychologist Steven Pinker (2002, p. 73) has noted that it is no wonder our emotions, drives, and reasoning "have a common logic across cultures": Our shared human traits "were shaped by natural selection acting over the course of human evolution."

Our Genetic Legacy

Our behavioral and biological similarities arise from our shared human *genome*, our common genetic profile. No more than 5 percent of the genetic differences among humans arise from population group differences. Some 95 percent of genetic variation exists *within* populations (Rosenberg et al., 2002). The typical genetic difference between two Icelandic villagers or between two Kenyans is much greater than the *average* difference between the two groups. Thus, if after a worldwide catastrophe only Icelanders or Kenyans survived, the human species would suffer only "a trivial reduction" in its genetic diversity (Lewontin, 1982).

And how did we develop this shared human genome? At the dawn of human history, our ancestors faced certain questions: Who is my ally, who my foe? What food should I eat? With whom should I mate? Some individuals answered those questions more successfully than others. For example, women who experienced nausea in the critical first three months of pregnancy were predisposed to avoid certain bitter, strongly flavored, and novel foods. Avoiding such foods has survival value, since they are the very foods most often toxic to

embryonic development (Schmitt & Pilcher, 2004). Early humans disposed to eat nourishing rather than poisonous foods survived to contribute their genes to later generations. Those who deemed leopards "nice to pet" often did not.

Similarly successful were those whose mating helped them produce and nurture offspring. Over generations, the genes of individuals not so disposed tended to be lost from the human gene pool. As success-enhancing genes continued to be selected, behavioral tendencies and thinking and learning capacities emerged that prepared our Stone Age ancestors to survive, reproduce, and send their genes into the future, and into you.

Across our cultural differences, we even share "a universal moral grammar," notes evolutionary psychologist Marc Hauser (2006, 2009). Men and women, young and old, liberal and conservative, living in Sydney or Seoul, all respond negatively when asked, "If a lethal gas is leaking into a vent and is headed toward a room with seven people, is it okay to push someone into the vent—saving the seven but killing the one?" And they all respond more approvingly when asked if it's okay to allow someone to fall into the vent, again sacrificing one life but saving seven. Our shared moral instincts survive from a distant past where we lived in small groups in which direct harm-doing was punished, argues Hauser. For all such universal human tendencies, from our intense need to give parental care to our shared fears and lusts, evolutionary theory proposes a one-stop shopping explanation (Schloss, 2009).

As inheritors of this prehistoric genetic legacy, we are predisposed to behave in ways that promoted our ancestors' surviving and reproducing. But in some ways, we are biologically prepared for a world that no longer exists. We love the taste of sweets and fats, which prepared our ancestors to survive famines, and we heed their call from school cafeterias, fast-food outlets, and vending machines. With famine now rare in Western cultures, obesity is truly a growing problem. Our natural dispositions, rooted deep in history, are mismatched with today's junk-food environment and today's threats such as climate change (Colarelli & Dettman, 2003).

Evolutionary Psychology Today

Darwin's theory of evolution has been an organizing principle for biology for a long time. Jared Diamond (2001) noted, "Virtually no contemporary scientists believe that Darwin was basically wrong." Today, Darwin's theory lives on in the *second Darwinian revolution*: the application of evolutionary principles to psychology. In concluding *On the Origin of Species*, Darwin anticipated this, foreseeing "open fields for far more important researches. Psychology will be based on a new foundation" (1859, p. 346).

In modules to come, we'll address questions that intrigue evolutionary psychologists, such as why infants start to fear strangers about the time they become mobile. Why are biological fathers so much less likely than unrelated boyfriends to abuse and murder the children with whom they share a home? Why do so many more people have phobias about spiders, snakes, and heights than about more dangerous threats, such as guns and electricity? And why do we fear air travel so much more than driving?

To see how evolutionary psychologists think and reason, let's pause now to explore their answers to these two questions: How are men and women alike? How and why does men's and women's sexuality differ?

An Evolutionary Explanation of Human Sexuality

15.2 How might an evolutionary psychologist explain gender differences in sexuality and mating preferences?

Having faced many similar challenges throughout history, men and women have adapted in similar ways. Whether male or female, we eat the same foods, avoid the same predators, and perceive, learn, and remember similarly. It is only in those domains where we have faced differing adaptive challenges—most obviously in behaviors related to reproduction—that we differ, say evolutionary psychologists.

FYI

Despite high infant mortality and rampant disease in past millennia, not one of your countless ancestors died childless.

FYI

Those who are troubled by an apparent conflict between scientific and religious accounts of human origins may find it helpful to recall from Module 2 that different perspectives of life can be complementary. For example, the scientific account attempts to tell us *when* and *how*; religious creation stories usually aim to tell about an ultimate *who* and *why*. As Galileo explained to the Grand Duchess Christina, "The Bible teaches how to go to heaven, not how the heavens go."

Before You Move On

▶ ASK YOURSELF

Whose reasoning do you find most persuasive—that of evolutionary psychologists or their critics? Why?

▶ TEST YOURSELF

What are the three main criticisms of evolutionary psychology's explanations?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Reflections on Nature and Nurture

15-4 What is included in the biopsychosocial approach to individual development?

"There are trivial truths and great truths," the physicist Niels Bohr reportedly said in reflecting on the paradoxes of science. "The opposite of a trivial truth is plainly false. The opposite of a great truth is also true." It appears true that our ancestral history helped form us as a species. Where there is variation, natural selection, and heredity, there will be evolution.

The unique gene combination created when our mother's egg engulfed our father's sperm predisposed both our shared humanity and our individual differences. This is a great truth about human nature. Genes form us.

But it also is true that our experiences form us. In our families and in our peer relationships, we learn ways of thinking and acting. Differences initiated by our nature may be amplified by our nurture. If genes and hormones predispose males to be more physically aggressive than females, culture may magnify this gender difference through norms that encourage males to be macho and females to be the kinder, gentler sex. If men are encouraged toward roles that demand physical power, and women toward more nurturing roles, each may then exhibit the actions expected of them and find themselves shaped accordingly. Roles remake their players. Presidents in time become more presidential, servants more servile. Gender roles similarly shape us.

But gender roles are converging. Brute strength has become increasingly irrelevant to power and status (think Bill Gates and Hillary Clinton). Thus both women and men are now seen as "fully capable of effectively carrying out organizational roles at all levels," note Wendy Wood and Alice Eagly (2002). And as women's employment in formerly male occupations has increased, gender differences in traditional masculinity or femininity and in what one seeks in a mate have diminished (Twenge, 1997). As the roles we play change over time, we change with them.

* * *

If nature and nurture jointly form us, are we "nothing but" the product of nature and nurture? Are we rigidly determined?

We are the product of nature and nurture (**FIGURE 15.1**), but we are also an open system, as suggested by the biopsychosocial approach (see Module 2). Genes are all pervasive but not all powerful; people may defy their genetic bent to reproduce by electing celibacy. Culture, too, is all pervasive but not all powerful; people may defy peer pressures and do the opposite of the expected. To excuse our failings by blaming our nature and nurture is what philosopher-novelist Jean-Paul Sartre called "bad faith"—attributing responsibility for one's fate to bad genes or bad influences.



Culture matters As this exhibit at San Diego's Museum of Man illustrates, children learn their culture. A baby's foot can step into any culture.

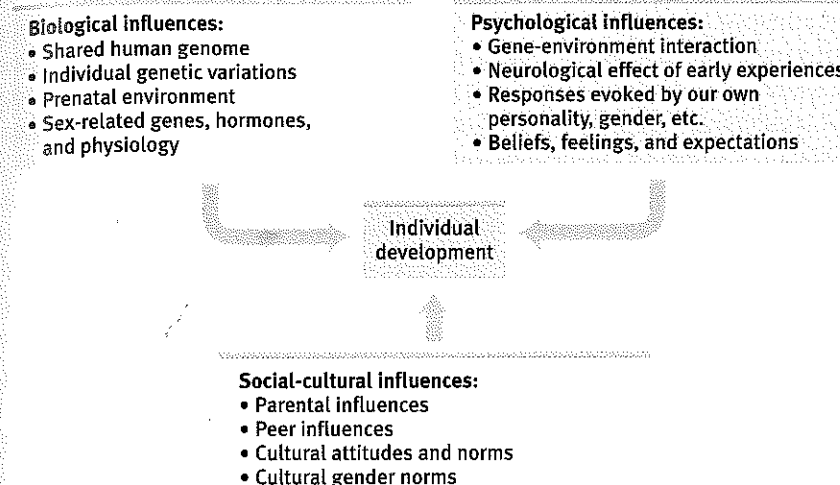


Figure 15.1
The biopsychosocial approach to individual development

In reality, we are both the creatures and the creators of our worlds. We are—it is a great truth—the products of our genes and environments. Nevertheless (another great truth), the stream of causation that shapes the future runs through our present choices. Our decisions today design our environments tomorrow. Mind matters. The human environment is not like the weather—something that just happens. We are its architects. Our hopes, goals, and expectations influence our future. And that is what enables cultures to vary and to change so quickly.

* * *

I know from my mail and from public opinion surveys that some readers feel troubled by the naturalism and evolutionism of contemporary science. Readers from other nations bear with me, but in the United States there is a wide gulf between scientific and lay thinking about evolution. "The idea that human minds are the product of evolution is . . . unassailable fact," declared a 2007 editorial in *Nature*, a leading science magazine. That sentiment concurs with a 2006 statement of "evidence-based facts" about evolution jointly issued by the national science academies of 66 nations (IAP, 2006). In *The Language of God*, Human Genome Project director Francis Collins (2006, pp. 141, 146), a self-described evangelical Christian, compiles the "utterly compelling" evidence that leads him to conclude that Darwin's big idea is "unquestionably correct." Yet Gallup reports that half of U.S. adults do not believe in evolution's role in "how human beings came to exist on Earth" (Newport, 2007). Many of those who dispute the scientific story worry that a science of behavior (and evolutionary science in particular) will destroy our sense of the beauty, mystery, and spiritual significance of the human creature. For those concerned, I offer some reassuring thoughts.

When Isaac Newton explained the rainbow in terms of light of differing wavelengths, the poet Keats feared that Newton had destroyed the rainbow's mysterious beauty. Yet, noted Richard Dawkins (1998) in *Unweaving the Rainbow*, Newton's analysis led to an even deeper mystery—Einstein's theory of special relativity. Moreover, nothing about Newton's optics need diminish our appreciation for the dramatic elegance of a rainbow arching across a brightening sky.



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"Let's hope that it's not true; but if it is true, let's hope that it doesn't become widely known." -LADY ASHLEY, COMMENTING ON DARWIN'S THEORY

"Is it not stirring to understand how the world actually works—that white light is made of colors, that color measures light waves, that transparent air reflects light . . . ? It does no harm to the romance of the sunset to know a little about it." —CARL SAGAN, *SKIES OF OTHER WORLDS*, 1988

When Galileo assembled evidence that the Earth revolved around the Sun, not vice versa, he did not offer irrefutable proof for his theory. Rather, he offered a coherent explanation for a variety of observations, such as the changing shadows cast by the Moon's mountains. His explanation eventually won the day because it described and explained things in a way that made sense, that hung together. Darwin's theory of evolution likewise is a coherent view of natural history. It offers an organizing principle that unifies various observations.

Collins is not the only person of faith to find the scientific idea of human origins congenial with his spirituality. In the fifth century, St. Augustine (quoted by Wilford, 1999) wrote, "The universe was brought into being in a less than fully formed state, but was gifted with the capacity to transform itself from unformed matter into a truly marvelous array of structures and life forms." Some 1600 years later, Pope John Paul II in 1996 welcomed a science-religion dialogue, finding it noteworthy that evolutionary theory "has been progressively accepted by researchers, following a series of discoveries in various fields of knowledge."

Meanwhile, many people of science are awestruck at the emerging understanding of the universe and the human creature. It boggles the mind—the entire universe popping out of a point some 14 billion years ago, and instantly inflating to cosmological size. Had the energy of this Big Bang been the tiniest bit less, the universe would have collapsed back on itself. Had it been the tiniest bit more, the result would have been a soup too thin to support life. Astronomer Sir Martin Rees has described *Just Six Numbers* (1999), any one of which, if changed ever so slightly, would produce a cosmos in which life could not exist. Had gravity been a tad bit stronger or weaker, or had the weight of a carbon proton been a wee bit different, our universe just wouldn't have worked.

What caused this almost-too-good-to-be-true, finely tuned universe? Why is there something rather than nothing? How did it come to be, in the words of Harvard-Smithsonian astrophysicist Owen Gingerich (1999), "so extraordinarily right, that it seemed the universe had been expressly designed to produce intelligent, sentient beings"? Is there a benevolent superintelligence behind it all? Have there instead been an infinite number of universes born and we just happen to be the lucky inhabitants of one that, by chance, was exquisitely fine-tuned to give birth to us? Or does that idea violate *Occam's razor*, the principle that we should prefer the simplest of competing explanations? On such matters, a humble, awed, scientific silence is appropriate, suggested philosopher Ludwig Wittgenstein: "Whereof one cannot speak, thereof one must be silent" (1922, p. 189).

Rather than fearing science, we can welcome its enlarging our understanding and awakening our sense of awe. In *The Fragile Species*, Lewis Thomas (1992) described his utter amazement that the Earth in time gave rise to bacteria and eventually to Bach's Mass in B Minor. In a short 4 billion years, life on Earth has come from nothing to structures as complex as a 6-billion-unit strand of DNA and the incomprehensible intricacy of the human brain. Atoms no different from those in a rock somehow formed dynamic entities that became conscious. Nature, says cosmologist Paul Davies (2007), seems cunningly and ingeniously devised to produce extraordinary, self-replicating, information-processing systems—us. Although we appear to have been created from dust, over eons of time, the end result is a priceless creature, one rich with potential beyond our imagining.

Before You Move On

▶ ASK YOURSELF

How have your heredity and your environment influenced who you are today? Can you recall an important time when you determined your own fate in a way that was at odds with pressure you felt from either your heredity or your environment?

▶ TEST YOURSELF

How does the biopsychosocial approach explain our individual development?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

"The causes of life's history [cannot] resolve the riddle of life's meaning." —STEPHEN JAY GOULD, *ROCKS OF AGES: SCIENCE AND RELIGION IN THE FULLNESS OF LIFE*, 1999

In this unit we have glimpsed an overriding principle: Everything psychological is simultaneously biological. We have focused on how our thoughts, feelings, and actions arise from our specialized yet integrated brain. In modules to come, we will further explore the significance of the biological revolution in psychology.

From nineteenth-century phrenology to today's neuroscience, we have come a long way. Yet what is unknown still dwarfs what is known. We can describe the brain. We can learn the functions of its parts. We can study how the parts communicate. But how do we get mind out of meat? How does the electrochemical whirl in a hunk of tissue the size of a head of lettuce give rise to elation, a creative idea, or that memory of Grandmother?

Much as gas and air can give rise to something different—fire—so also, believed Roger Sperry, does the complex human brain give rise to something different: *consciousness*. The mind, he argued, emerges from the brain's dance of ions, yet is not reducible to it. Cells cannot be fully explained by the actions of atoms, nor minds by the activity of cells. Psychology is rooted in biology, which is rooted in chemistry, which is rooted in physics. Yet psychology is more than applied physics. As Jerome Kagan (1998) reminded us, the meaning of the Gettysburg Address is not reducible to neural activity. Communication is more than air flowing over our vocal cords. Morality and responsibility become possible when we understand the mind as a "holistic system," said Sperry (1992) (FIGURE 15.2). We are not mere jabbering robots.

The mind seeking to understand the brain—that is indeed among the ultimate scientific challenges. And so it will always be. To paraphrase cosmologist John Barrow, a brain simple enough to be understood is too simple to produce a mind able to understand it.

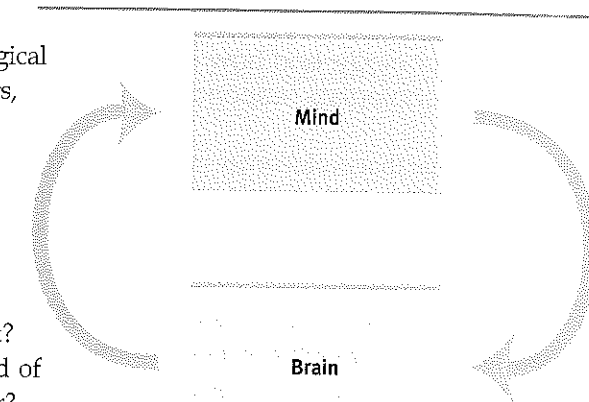


Figure 15.2
Mind and brain as holistic system In Roger Sperry's view, the brain creates and controls the emergent mind, which in turn influences the brain. (Think vividly about biting into a lemon and you may salivate.)

Module 15 Review

15-1 How do evolutionary psychologists use natural selection to explain behavior tendencies?

- Evolutionary psychologists seek to understand how our traits and behavior tendencies are shaped by *natural selection*, as genetic variations increasing the odds of reproducing and surviving are most likely to be passed on to future generations.
- Some genetic variations arise from *mutations* (random errors in gene replication), others from new gene combinations at conception.
- Humans share a genetic legacy and are predisposed to behave in ways that promoted our ancestors' surviving and reproducing.
- Charles Darwin's theory of evolution is an organizing principle in biology. He anticipated today's application of evolutionary principles in psychology.

15-2 How might an evolutionary psychologist explain gender differences in sexuality and mating preferences?

- Men tend to have a recreational view of sexual activity; women tend to have a relational view.
- Evolutionary psychologists reason that men's attraction to multiple healthy, fertile-appearing partners increases their chances of spreading their genes widely.
- Because women incubate and nurse babies, they increase their own and their children's chances of survival by searching for mates with the potential for long-term investment in their joint offspring.